Metabolism of 3-deoxy-3-fluoro-D-glucose by *Pseudomonas aeruginosa*

J. H. SCOTT FOSTER AND N. F. TAYLOR
School of Pharmacy and School of Biological Sciences, Bath University, Claverton Down, Bath, BA2 7AY, U.K.

As part of a program of investigation concerned with the metabolic effects of monofluorinated deoxysugars on yeast (Woodward, Taylor & Brunt, 1969) and certain micro-organisms, including *Pseudomonas fluorescens* (White & Taylor, 1970), we have investigated the effect of 3-deoxy-3-fluoro-D-glucose (3 FG) on *Pseudomonas aeruginosa.*

P. aeruginosa was incubated in a mineral salts medium with glucose, glucose + 3 FG, and 3 FG as carbon sources at 37° on an orbital shaker. At first growth only occurred where glucose was present as the carbon source, but subsequently the organism was induced to grow on 3 FG as the sole carbon source. Subsequent experiments showed that growth rates, utilisation of carbon source, and final cell density were similar for both glucose and 3 FG. In addition, after an initial lag, fluoride ion (F^-) was released quantitatively. 3-deoxy-3-fluoro-D-gluconic acid (3 FGA) and 3-deoxy-3-fluoro-2-keto-D-gluconic acid (3 F2KGA) also served as sole carbon sources, F^- being quantitatively released after a lag period. No F^- was detected when *P. aeruginosa* was incubated with β-fluoro-pyruvate.

Oxygen uptake was studied using Warburg respirometers (Umbreit, Burris & Stauffer, 1964) and it was found that during the lag phase when F^- was not released two atoms of O_2 were consumed per mol of 3 FG and one atom of O_2 per mol of 3 FGA ozidized.

Using Eastman precoated silica gel t.l.c. sheets and a solvent system composed of acetic acid–ethyl acetate–water (3:3:1), 3 FGA was detected in the concentrated culture filtrate of lag phase 3 FG cultures. The spots were visualized with *p*-anisidine. 3 F2KGA was not identified positively using this system, but previous work with gas-liquid chromatography has suggested that it was present in trace amounts.

Work with fractionated, disrupted, cell suspensions (Watkins, 1970) showed that the cell envelope fraction released F^- from 3 FG and 3 FGA at approximately ten times the rate as did the cytoplasmic fraction.

These results suggest that *P. aeruginosa* metabolized 3 FG by the Entner-Douderoff pathway in a similar manner to glucose. The oxidation proceeded as far as 3 F2KGA with the consumption of two O_2 atoms per mol of 3 FG, at which stage the F^- is lost when the 6 carbon compound is cleaved to two 3 carbon compounds. The enzyme system responsible for the C–F bond cleavage is probably located in the cytoplasmic membrane.

REFERENCES

UMBREIT, W. W., BURRIS, R. H. & STAUFFER, J. F. (1964). *Manometric Techniques.* pp. 1–61. Minneapolis: Burgess.
WATKINS, W. W. (1970). Ph.D. Thesis, Bath University.
WHITE, F. H. & TAYLOR, N. F. (1870). *FEBS Letters*, **11**, 268.
WOODWARD, B., TAYLOR, N. F. & BRUNT, R. V. (1969). *Biochem. J.*, **114**, 445.

The inactivation of phenylmercuric nitrate by sodium metabisulphite

J. BUCKLES, M. W. BROWN AND G. S. PORTER
School of Pharmacy, Liverpool Polytechnic, Byrom Street, Liverpool, U.K.

During work in this School concerning the uptake of phenylmercuric nitrate from solution by rubber closures, a greater rate of fall in phenylmercuric nitrate concentration was noted in the presence of sodium metabisulphte than in its absence. Aqueous solutions containing both phenylmercuric nitrate and sodium metabisulphite were therefore examined to assess any effect the latter substance might have on the phenylmercuric nitrate concentration under normal conditions of storage and sterilization. Phenylmercuric nitrate concentrations were determined by a polarographic method (Porter, 1968); antibacterial activity was monitored by the cup plate method with *Staphylococcus aureus* (N.C.T.C. 7447), as test organism.

Storage experiments. Ampoules containing a solution of phenylmercuric nitrate (20·0 μg/ml) with sodium metabisuphite (1·0 mg/ml) were kept at laboratory temperature and assayed weekly. Both phenylmercuric nitrate content and antibacterial activity fell steadily;